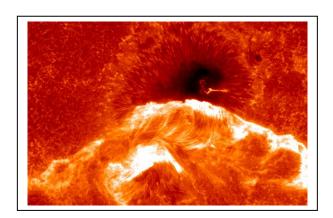
What time is it?

London	Frankfurt	Singapore	Tokyo	NEW YORK	LONDON	MADRID	HONG KONG
12:47	13:47	19:47	20:47	07:47	12:47	13:47	19:47

City	Time	City	Time	
London	0:00	Rio de Janeiro	-1:00	
Frankfurt	+1:00	Halifax	-4:00	
Rome	+1:00	New York	-5:00	
Athens	+2:00	Chicago	-6:00	
Istanbul	+2:00	Mexico City	-6:00	
Moscow	+3:00	Denver	-7:00	
Mumbai	+5:30	San Francisco	-8:00	
Beijing	+8:00	Anchorage	-9:00	
Tokyo	+9:00	Honolulu	-10:00	

No matter where we live on Earth, we all agree that during the middle of the day (we call this Noon, 12:00 PM or 12:00) the sun is at its highest point in the sky. But Earth is so big that if your Local Time clock says '12:00 Noon' in London, at that exact moment, it will be 14:00 in Cairo, or 19:00 in Singapore. When astronomers describe events in the sky they use Greenwich Mean Time (GMT), which is the time that is recorded on a clock in Greenwich, England.

To convert GMT to the Local Time in your city, you have to add or subtract the proper number of hours in your Time Zone. The table shows the hours you need to add (traveling east of Greenwich) or subtract (traveling west of Greenwich) to GMT to get the Local Time. **Example:** New York is <u>west</u> of Greenwich and has a Local Time 5 hours <u>earlier</u> than GMT, so 12:47 GMT in Greenwich becomes 07:47 Local Time in New York. As you travel <u>east</u> from Greenwich to Tokyo, the Local Time in Tokyo is 9 hours later than GMT, so 12:47 GMT becomes 21:47 Local Time in Tokyo.



Problem - On December 13, 2006, the sun produced a powerful solar flare at 02:34 GMT, which was photographed by the Hinode solar satellite (picture to the left). Six astronomers wanted to observe the sun just after the solar flare. They lived in Tokyo, Athens, Frankfurt, Denver, Honolulu and Beijing. At what Local Time for each astronomer did the flare occur, and which astronomers were not able to study the solar flare at the time it happened?

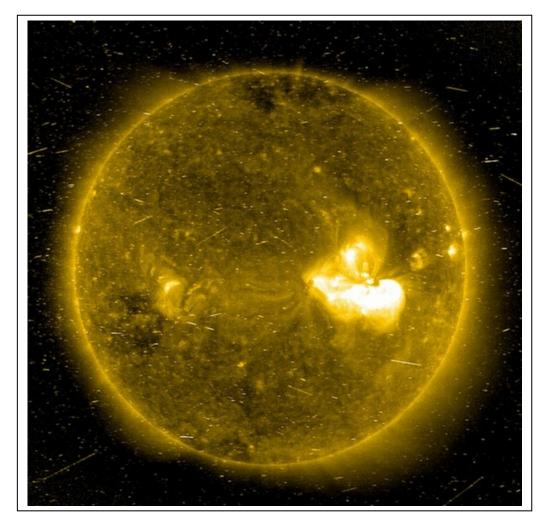
From the table you can get the hours to add or subtract for each city.

02:34 GMT converted to Local Time:

Hours	Local	Time
+9:00	11:34	December 13
+2:00	04:34	December 13
+1:00	03:34	December 13
-7:00	19:34	December 12
-10:00	16:34	December 12
+8:00	10:34	December 13
	+2:00 +1:00 -7:00 -10:00	+9:00 11:34 +2:00 04:34 +1:00 03:34 -7:00 19:34 -10:00 16:34

Only the astronomers in Tokyo, Honolulu and Beijing can see the solar flare. The astronomers in Tokyo, Honolulu and Beijing see the sun above the horizon during the daytime, but from Athens, Frankfurt and Denver it is night time where these astronomers are located and the sun is below the horizon.

The photograph of the sun below was taken by the SOHO satellite and shows the December 13, 2006 solar flare.



Space Math

http://spacemath.gsfc.nasa.gov